**State, ACT, and Common Core Standards Alignment**

Standards to Use for Common Benchmark Assessment Development—Chemistry (going to put in writing standards when creating lab write-up rubric)

| ***Tennessee Standards*** | **ACT Standards** | **Common Core Standards** | |
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| |  | | --- | | **SPI 3210 Inq.1** Select a description or scenario that reevaluates and/or extends a scientific finding. | | EM.2 Identify key issues or  assumptions in a model | KID.1 Cite specific textual evidence to support analysis of  science and technical texts, attending to important  distinctions the author makes and to any gaps or  inconsistencies in the account. |
| |  | | --- | | **SPI 3210 Inq.2** Analyze the components of a properly designed scientific investigation. | | SI.2. Understand a simple  experimental design  SI.3. Identify a control in an  Experiment | KID.3 Follow precisely a complex multistep procedure  when carrying out experiments, taking  measurements, or performing technical tasks;  analyze the specific results based on explanations  in the text.  CS.6 Analyze the author’s purpose in providing an  explanation, describing a procedure, or discussing  an experiment in a text, identifying important  issues that remain unresolved. |
| |  | | --- | | **SPI 3210 Inq.3** Determine appropriate tools to gather precise and accurate data. | | SI.1. Understand the methods and  tools used in a moderately  complex experiment |  |
| |  | | --- | | **SPI 3210 Inq.4** Evaluate the accuracy and precision of data. | | I.D.1 Select data from a complex  data presentation (e.g., a table  or graph with more than three  variables; a phase diagram)  I.D.2 Compare or combine data from  a simple data presentation (e.g.,  order or sum data from a table)  SI.4 Identify similarities and  differences between  experiments | IKI.7 Integrate and evaluate multiple sources of  information presented in diverse formats and  media (e.g., quantitative data, video, multimedia) in  order to address a question or solve a problem.  IKI.8 Evaluate the hypotheses, data, analysis, and  conclusions in a science or technical text, verifying  the data when possible and corroborating or  challenging conclusions with other sources of  information. |
| |  | | --- | | **SPI 3210 Inq.5** Defend a conclusion based on scientific evidence. | | E.M.1Select a simple hypothesis,  prediction, or conclusion  that is supported by a data  presentation or a model | KID.1 Cite specific textual evidence to support analysis of  science and technical texts, attending to important  distinctions the author makes and to any gaps or  inconsistencies in the account.  IKI.7 Integrate and evaluate multiple sources of  information presented in diverse formats and  media (e.g., quantitative data, video, multimedia) in  order to address a question or solve a problem.  IKI.8 Evaluate the hypotheses, data, analysis, and  conclusions in a science or technical text, verifying  the data when possible and corroborating or  challenging conclusions with other sources of  information. |
| |  | | --- | | **SPI 3210 Inq.6** Determine why a conclusion is free of bias. | | SI.1. Understand the methods and  tools used in a moderately  complex experiment  SI.2 Understand a simple  experimental design | IKI.8 Evaluate the hypotheses, data, analysis, and  conclusions in a science or technical text, verifying  the data when possible and corroborating or  challenging conclusions with other sources of  information. |
| |  | | --- | | **SPI 3210 Inq.7** Compare conclusions that offer different, but acceptable explanations for the same setoff experimental data | | I.D.1 Select data from a complex  data presentation (e.g., a table  or graph with more than three  variables; a phase diagram)  I.D.2 Compare or combine data from  a simple data presentation (e.g.,  order or sum data from a table)  SI.4 Identify similarities and  differences between  experiments | KID.1 Cite specific textual evidence to support analysis of  science and technical texts, attending to important  distinctions the author makes and to any gaps or  inconsistencies in the account.  IKI.9 Synthesize information from a range of sources  (e.g., texts, experiments, simulations) into a  coherent understanding of a process, phenomenon,  or concept, resolving conflicting information when  possible.. |
| |  | | --- | | **SPI 3210.T/E.1** Distinguish among tools and procedures best suited to conduct a specified scientific inquiry. | | SI.1. Understand the methods and  tools used in a moderately  complex experiment |  |
| |  | | --- | | **SPI 3210.T/E.2** Evaluate a protocol to determine the degree to which an engineering design process was successfully applied. | | SI.2. Understand a simple  experimental design | KID.3 Follow precisely a complex multistep procedure  when carrying out experiments, taking  measurements, or performing technical tasks;  analyze the specific results based on explanations  in the text.  IKI.7 Integrate and evaluate multiple sources of  information presented in diverse formats and  media (e.g., quantitative data, video, multimedia) in  order to address a question or solve a problem. |
| |  | | --- | | **SPI 3210.T/E.3** Evaluate the overall benefit to cost ratio of a new technology. | | ID.2. Compare or combine data from  a simple data presentation (e.g.,  order or sum data from a table)  SI.4 |  |
| |  | | --- | | **SPI 3210.T/E.4** Use design principles to determine how a new technology will improve the quality of life for an intended audience. | | EM.2 Identify key issues or  assumptions in a model |  |
| |  | | --- | | **SPI 3221.Math.1** Use real numbers to represent real-world applications (e.g., slope, rate of change, probability, and proportionality). | | MATHBOA.1 Solve routine two-step or threestep  arithmetic problems involving  concepts such as rate and  proportion, tax added, percentage  off, and computing with a given  average | CS.4 Determine the meaning of symbols, key terms, and  other domain-specific words and phrases as they  are used in a specific scientific or technical context relevant to *grades 11–12 texts and topics*. |
| |  | | --- | | **SPI 3221.Math.2** Perform operations on algebraic expressions and informally justify the selected procedures. | | MATHBOA.1 Solve routine two-step or threestep  arithmetic problems involving  concepts such as rate and  proportion, tax added, percentage  off, and computing with a given  average | CS.4 Determine the meaning of symbols, key terms, and  other domain-specific words and phrases as they  are used in a specific scientific or technical context relevant to *grades 11–12 texts and topics*. |
| |  | | --- | | **SPI 3210.Math.3** Interpret graphs that depict real-world phenomena. | | ID.1 Select data from a complex  data presentation (e.g., a table  or graph with more than three  variables; a phase diagram)  ID.2 Compare or combine data from  a simple data presentation (e.g.,  order or sum data from a table)  SI.4. Identify similarities and  differences between  experiments  EM.1 Select a simple hypothesis,  prediction, or conclusion  that is supported by a data  presentation or a model | IKI.7 Integrate and evaluate multiple sources of  information presented in diverse formats and  media (e.g., quantitative data, video, multimedia) in  order to address a question or solve a problem.  CS.4 Determine the meaning of symbols, key terms, and  other domain-specific words and phrases as they  are used in a specific scientific or technical context relevant to *grades 11–12 texts and topics*. |
| |  | | --- | | **SPI 3221.Math.4** Apply measurement unit relationships including Avogadro’s number, molarity, molality, volume, and mass to balance chemical equations. | | MATHBOA.1 Solve routine two-step or threestep  arithmetic problems involving  concepts such as rate and  proportion, tax added, percentage  off, and computing with a given  average |  |
| |  | | --- | | **SPI 3221.Math.5** Use concepts of mass, length, area, and volume to estimate and solve real-world problems. | | MATHBOA.1 Solve routine two-step or threestep  arithmetic problems involving  concepts such as rate and  proportion, tax added, percentage  off, and computing with a given  average |  |
| Unit 1  **SPI 3221.1.1** Compare and contrast the major models of the atom ~~(e.g., Democritus, Thomson, Rutherford,~~ Bohr, and the quantum mechanical model).  **SPI 3221.1.2** Interpret the periodic table to describe an element’s atomic makeup.  **SPI 3221.1.3** Describe the trends found in the periodic table with respect to atomic size, ionization energy, electron affinity, or electronegativity.  **SPI 3221.1.4** Determine the Lewis electron-dot structure or number of valence electrons for an atom of any main-group element from its atomic number or position in the periodic table.  **SPI 3221.1.5** Represent an electron’s location in the quantum mechanical model of an atom in terms of the shape of electron clouds (s and p orbitals in particular), relative energies of orbitals, and the number of electrons possible in the s, p, d and f orbitals. | ID.1  ID.2  SI.1  SI.2  SI.3  SI.4  EM.1  EM.2 | .KID.2  KID.3  CS.4  IKI.9 |
| Unit 2  **SPI 3221.2.1** Distinguish among elements, compounds, and mixtures ~~solutions, colloids, and suspensions.~~  **SPI 3221.3.1** Analyze ionic and covalent compounds in terms of how they form, names, chemical formulas, percent composition, and ~~molar masses~~. | ID.1 Select data from a complex  data presentation (e.g., a table  or graph with more than three  variables; a phase diagram)  ID.2 Compare or combine data from  a simple data presentation (e.g.,  order or sum data from a table)  SI.1  SI.2  EM.1 | KID.1  KID.2  KID.3  CS.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 11–12 texts and topics*. |
| **Unit 3**  **SPI 3221.3.5** Convert among the following quantities of a substance: mass, number of moles, number of particles, molar volume at STP. | SI.1  SI.2  SI.3  SI.4  EM.1 | KID.1  KID.2  KID.3  CS.4 |
| **Unit 4**   |  | | --- | | **SPI 3221.2.4 Classify a property of change in matter as physical, chemical, or nuclear.** | | **SPI 3221.2.5** Compare and contrast heat and temperature changes in chemical and physical processes.  **SPI 3221.2.6** Investigate similarities and differences among solids, liquids and gases in terms of energy and particle spacing. | | ID.1  ID.2  ID.3  SI.1  SI.2  EM.1 | KID.1  KID.2  KID.3  IKI.8  IKI.9 |
| **Unit 5**  **SPI 3221.2.7** Predict how changes in volume, temperature, and pressure affect the behavior of a gas.  **SPI 3221.2.1** ~~Distinguish among elements, compounds~~, solutions, colloids, and suspensions.  **SPI 3221.2.2** Identify properties of a solution: solute and solvent in a solid, liquid or gaseous solution; procedure to make or determine the concentration of a solution in units of ppm, ppb, molarity, molality, percent composition, factors that affect the rate of solution, and colligative properties.  **SPI 3221.2.3** Classify a solution as saturated, unsaturated, or supersaturated based on its composition and temperature and a solubility graph. | ID.1  ID.2  ID.3  SI.1  SI.2  SI.4  EM.1  EM.2 | KID.1  KID.3  IKI.7  IKI.8  IKI.9 |
| **Unit 6**  **SPI 3221.3.2** Identify the reactants, products, and types of different chemical reactions: composition, decomposition, double replacement, single replacement, combustion.  **SPI 3221.3.3** Predict the products of a chemical reaction.  **SPI 3221.3.4** Balance a chemical equation to determine molar ratios.  **SPI 3221.3.6** Identify and solve stoichiometry problems: volume at STP to mass, moles to mass, and molarity.  **SPI 3221.3.10** Relate the laws of conservation of mass/~~energy to thermal changes that occur during physical, chemical, or nuclear processes~~ | SI.1  SI.2  SI.3  EM.1  EM.2 | KID.1  KID.3  CS.4  IKI.8  IKI.9 |
| **Unit 7**  **SPI 3221.3.10** Relate the laws of conservation of ~~mass~~/energy to thermal changes that occur during physical, chemical, or nuclear processes  **SPI 3221.2.5** Compare and contrast heat and temperature changes in chemical and physical processes. | ID.3  SI.1  SI.2  SI.3  SI.4  EM.1  EM.2 | KID.1  KID.2  IKI.7  IKI.8 |
| **Unit 8**  **SPI 3221.3.7** Classify substances as acids or bases based on their formulas and how they react with various indicators.  **SPI 3221.3.8** Describe radioactive decay through a balanced nuclear equation and through an analysis of the half-life concept.  **SPI 3221.3.9** Compare and contrast nuclear fission and fusion. | ID.1  ID.2  ID.3  SI.1  SI.2  EM.1  EM.2 | KID.1  KID.3  IKI.7  IKI.8  IKI.9 |